

Claims**What is claimed is:**

1. A piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
a voltage-boosting means for converting a low-voltage power supply to a high voltage; and
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave.

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2. The piezoelectric pump drive circuit according to claim 1, wherein said amplification means is composed of: a D-class amplifier that is driven at high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier.

3. The piezoelectric pump drive circuit according to claim 1 or claim 2, further comprising a first control means for implementing variable frequency control at the time of activating said sine wave oscillation means.

4. The piezoelectric pump drive circuit according to any one of claims 1 to 3, further comprising: a temperature sensing means for sensing temperature; and a second control means for adjusting the signal amplitude of said sine wave oscillation means according to the sensed temperature of said

5 temperature sensing means.

5. The cooling system comprising;
 - a piezoelectric pump drive circuit according to any one of claims 1 to 4;
 - a heat sink that contacts a heat-generating body;
 - a radiator for radiating heat to the outside;
- 5 coolant circulation passages connected such that coolant circulates between said heat sink and said radiator; and
- a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages.

Amended Claims**What is claimed is:**

1. (Amended) A piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
a voltage-boosting means for converting a low-voltage power supply to a high voltage; and
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;
- 10 wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier.
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2. (Amended) A piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
a voltage-boosting means for converting a low-voltage power supply to a high voltage;
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave; and
10 control means for implementing variable frequency control over three or more

different frequencies at the time of activation of said sine wave oscillation means.

3. (Amended) A piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
a voltage-boosting means for converting a low-voltage power supply to a high voltage;
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave; and
10 control means for implementing variable control of the frequency at the time of activation of said sine wave oscillation means;
wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier.
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4. (Amended) A piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
a voltage-boosting means for converting a low-voltage power supply to a high voltage;
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine

wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;

- 10 a temperature sensing means for sensing temperature; and
a control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means.

5. *(Amended)* A piezoelectric pump drive circuit comprising:

a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
a voltage-boosting means for converting a low-voltage power supply to a high

5 voltage;

an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;

- 10 a temperature sensing means for sensing temperature; and
a control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means;
wherein said amplification means is composed of: a D-class amplifier driven by
15 a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier.

6. *(Added)* A piezoelectric pump drive circuit comprising:

- a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
- a voltage-boosting means for converting a low-voltage power supply to a high voltage;
- an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;
- 10 a first control means for implementing variable frequency control at the time of activation of said sine wave oscillation means;
- a temperature sensing means for sensing temperature; and
- 15 a second control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means.

7. (Added) A piezoelectric pump drive circuit comprising:
- a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
- a voltage-boosting means for converting a low-voltage power supply to a high voltage;
- an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;
- 10 a first control means for implementing variable frequency control at the time of activation of said sine wave oscillation means;
- a temperature sensing means for sensing temperature; and

a second control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said
15 temperature sensing means;
wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the
20 output signal of said D-class amplifier.

8. *(Added)* A cooling system comprising:
a piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
5 a voltage-boosting means for converting a low-voltage power supply to a high voltage; and
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-
10 voltage sine wave;
wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the
15 output signal of said D-class amplifier;
a heat sink that contacts a heat-generating body;
a radiator for radiating heat to the outside;
coolant circulation passages connected such that coolant circulates between

said heat sink and said radiator; and

- 20 a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages.

9. (Added) A cooling system comprising:

a piezoelectric pump drive circuit comprising:

a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;

- 5 a voltage-boosting means for converting a low-voltage power supply to a high voltage;

an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-

- 10 voltage sine wave; and

control means for implementing variable frequency control over three or more different frequencies at the time of activation of said sine wave oscillation means;

a heat sink that contacts a heat-generating body;

- 15 a radiator for radiating heat to the outside;

coolant circulation passages connected such that coolant circulates between said heat sink and said radiator;

a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages.

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10. (Added) A cooling system comprising:

a piezoelectric pump drive circuit comprising:

a sine wave oscillation means for generating a sine wave signal of the

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- frequency that drives a piezoelectric element of a piezoelectric pump;
- 5 a voltage-boosting means for converting a low-voltage power supply to a high voltage;
- an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-
- 10 voltage sine wave; and
- a control means for implementing variable frequency control at the time of activation of said sine wave oscillation means;
- wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the
- 15 signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier;
- a heat sink that contacts a heat-generating body;
- a radiator for radiating heat to the outside;
- 20 coolant circulation passages connected such that coolant circulates between said heat sink and said radiator; and
- a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages.

11. (Added) A cooling system comprising: -

- a piezoelectric pump drive circuit comprising:
- a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
- 5 a voltage-boosting means for converting a low-voltage power supply to a high voltage;

- an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;
- 10 a temperature sensing means for sensing temperature; and
a control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means;
- 15 a heat sink that contacts a heat-generating body;
a radiator for radiating heat to the outside;
coolant circulation passages connected such that coolant circulates between said heat sink and said radiator; and
a piezoelectric pump that is driven by said piezoelectric pump drive circuit for
- 20 circulating coolant in said coolant circulation passages.

12. (Added) A cooling system comprising:

- a piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
- 5 a voltage-boosting means for converting a low-voltage power supply to a high voltage;
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;
- 10 a temperature sensing means for sensing temperature; and
a control means for adjusting the signal amplitude of said sine wave oscillation

means in accordance with the sensed temperature of said temperature sensing means;

- 15 wherein said amplification means is composed of: a D-class amplifier driven by a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier;
- 20 a heat sink that contacts a heat-generating body;
a radiator for radiating heat to the outside;
coolant circulation passages connected such that coolant circulates between said heat sink and said radiator; and
a piezoelectric pump that is driven by said piezoelectric pump drive circuit for
25 circulating coolant in said coolant circulation passages.

13. *(Added)* A cooling system comprising:

- a piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump;
- 5 a voltage-boosting means for converting a low-voltage power supply to a high voltage;
an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave;
- 10 a first control means for implementing variable frequency control at the time of activation of said sine wave oscillation means;
a temperature sensing means for sensing temperature; and

a second control means for adjusting the signal amplitude of said sine wave
15 oscillation means in accordance with the sensed temperature of said
temperature sensing means;
a heat sink that contacts a heat-generating body;
a radiator for radiating heat to the outside;
coolant circulation passages connected such that coolant circulates between
20 said heat sink and said radiator; and
a piezoelectric pump that is driven by said piezoelectric pump drive circuit for
circulating coolant in said coolant circulation passages.

14. (Added) A cooling system comprising:
a piezoelectric pump drive circuit comprising:
a sine wave oscillation means for generating a sine wave signal of the
frequency that drives a piezoelectric element of a piezoelectric pump;
5 a voltage-boosting means for converting a low-voltage power supply to a high
voltage;
an amplification means driven by high voltage generated by said voltage-
boosting means for amplifying the signal supplied as output from said sine
wave oscillation means and for driving said piezoelectric element by a high-
10 voltage sine wave;
a first control means for implementing variable frequency control at the time of
activation of said sine wave oscillation means;
a temperature sensing means for sensing temperature; and
a second control means for adjusting the signal amplitude of said sine wave
15 oscillation means in accordance with the sensed temperature of said
temperature sensing means;
wherein said amplification means is composed of: a D-class amplifier driven by

a high voltage generated by said voltage-boosting means for subjecting the signal supplied as output from said sine wave oscillation means to pulse-width
20 modulation to realize amplification; and a low-pass filter for demodulating the output signal of said D-class amplifier;

a heat sink that contacts a heat-generating body;

a radiator for radiating heat to the outside;

coolant circulation passages connected such that coolant circulates between
25 said heat sink and said radiator; and

a piezoelectric pump that is driven by said piezoelectric pump drive circuit for circulating coolant in said coolant circulation passages.

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